Focus. . . Missouri 1997 Prenatal Drug Prevalence Study

The Missouri Department of Health is mandated to conduct periodic statewide drug prevalence studies to determine the extent of tobacco, alcohol, and illegal substance use during pregnancy. This charge is the result of legislation passed in 1991 (Chapter 191, Sections 191.725-191.745, Rms.) which addresses assessment, education, and referral for drug usage during pregnancy. What follows are the results of the 1997 study with a comparison to the initial 1993 study. Both studies had the same overall design to facilitate comparison.

Methods

A statewide sample of delivering women was secured utilizing a multi-stage probability proportional to size sampling design. Missouri's 65 non-military hospital that were expected to experience a minimum of 200 deliveries in 1997 constituted the sampling frame using Jan-May 1996 events. These hospitals represented approximately 96 percent of the Missouri resident births during that time period.

The state was divided into three major regions. Within each region, probability proportional to size sampling was performed to randomly select eight hospitals from the St. Louis metro region, five from the Kansas City metro region and nine from the remaining outstate region. Before the randomly selected hospitals were acquired, one hospital in the Kansas City metro, one in outstate, and two in the St. Louis metro region were pulled out and included in the study as self-representers because their obstetrical population was expected to be more likely to use cocaine than women going to other hospitals. This was confirmed in the study.

The study sample represented 60 percent of the recorded births and fetal deaths for the hospitals involved during their respective study periods. The final realized sample was generally representative of the defined population according to a comparison made with the recorded birth and fetal death records for that time period with regard to the distribution of race, age, Medicaid status and lack of prenatal care. The final maternal chart/urine sample size was 3,096 vs. 2,008 for 1993.

Data were collected from May through December 1997. The study population included all women admitted consecutively for delivery at each of the participating hospitals, with pregnancies of 20 weeks or more gestation. Each hospital initiated sample collection on a specified date with significant overlap of collection periods among most hospitals.

A portion of the routine urine specimen collected after admission for delivery was obtained for analysis. Demographic data, obstetrical history, including self-reported use of alcohol, tobacco, and other drugs (licit and illicit) during pregnancy, prenatal care status and delivery information were acquired from the obstetrical floor charts and/or normal intake interviews. Additional information included delivery outcome, birth weight, gestational age, and prescription medications.

All specimens were analyzed in a laboratory certified by the National Institute on Drug Abuse (University of Missouri, Toxicology Laboratory, Columbia. MO). Laboratory personnel received specimens labeled only with the coded identifiers.

For 1997 all positive screens were confirmed whereas for 1993 confirmation was completed for a sample of positive screens. Drug detection times vary widely with most illegal drugs traceable in urine a minimum of three days following their use with heavy users of marijuana remaining positive for up to two weeks after cessation.

Expansion weights were developed at the hospital level to represent that hospital's deliveries for one year and to account for over/undersampling. Post-stratification was utilized to adjust the sample's racial (black, non-black), birth weight (LBW, non-LBW) and pregnancy outcome type (live birth, fetal death) distribution of deliveries to those of the population in the region and state for 1997. SUDAAN (SUrvey DAta ANalysis) was used to calculate the weighted prevalence estimates and standard errors, taking the sampling design into account.

Results

Table 1 shows significant decreases between 1993 and 1997 in estimated prevalence of alcohol (chart abstraction) and cocaine (urine specimen) usage just prior to delivery, with decreases of 54.4 and 46 percent, respectively. The estimated prevalence of cocaine usage decreased for both white non-Hispanic and black non-Hispanics from 0.3 to 0.2 and from 5.9 to 3.2 percent, respectively. The estimated prevalence of alcohol usage as detected by urine was 1.6 percent in 1997. This low estimate was expected because the detection period for alcohol in urine is very short (less than 6 hours on average). The prevalence of tobacco usage showed no significant change (21.9 in 1993 to 21.0 percent in 1997), while the prevalence of marijuana (4.0 vs. 4.3), methamphetamines (0.2 vs. 0.3) and phencyclidine (0.02 vs. 0.03) showed slight increases.

The estimated prevalence of illegal drug usage decreased by over 50 percent (10.8 in 1993 vs. 5.2 in 1997); however, this may be misleading because most of the decrease is due to barbiturate and opiate usage which have problems with ascertainment. Barbiturates and opiate detection in urine may signal illegal use in pregnancy or use of prescription medications that were not recorded in the chart abstraction process. Cocaine and marijuana combined showed a non-significant decrease from 1993 to 1997. Because of problems with differentiating illegal and legal usage of some drugs, very low detection of some drugs, and space only the four major substances (alcohol, tobacco, cocaine and marijuana) are reviewed in this article.

Significant variation in substance usage between race/ethnic groups was noted with Hispanics having the lowest prevalences for all but alcohol. White non-Hispanic women had significantly higher prevalence of tobacco usage (22.5 vs. 16.5 for blacks vs. 7.5 for Hispanics) than the other two groups. White non-Hispanic and black non-Hispanic women had sig nificantly higher marijuana prevalence rates than Hispanics (4.5, 4.5, and 0.4 respectively). The black non-Hispanic prevalence rates for alcohol and cocaine were significantly higher than the corresponding rates for white non-Hispanics. No cocaine was detected in the urine specimens of Hispanic women.

Table 2 shows prevalence estimates in relation to maternal age. In all cases but cocaine the highest prevalence estimates are noted for the 20-24 age group. For cocaine the highest prevalence rate was noted for the 30 or more age group, with all age groups 20 and over having significantly higher rates than noted for ages under 20. The trends by age for cocaine usage do not reflect all races because of its low prevalence in nonblack groups. For black non-Hispanic women, the estimate of cocaine usage increased from zero for ages under 20 to 10 percent for women ages 30 or more.

The tobacco prevalence for the under 20 age group as measured by urine specimens increased from 17.1 to 23.2 for 1997, with a less dramatic increase noted for women ages 20-24 (25.2 to 27.1). These results of increases in smoking prevalences for these two age groups have also been detected using birth certificate data (see Missouri Monthly Vital Statistics, Vol. 32, No. 6).

As reflected in Table 3 and from prior studies 'no prenatal care' is one of the major indicators of whether a woman is using one or more of the four substances. Of those women not receiving prenatal care one in sixteen used alcohol, two in five smoked, one in seven used marijuana and over one in five used cocaine. Tobacco usage was

significantly higher for all women coming into prenatal care after the first trimester; and marijuana and cocaine usage were significantly higher for third trimester entry than first. Alcohol usage from urine analysis showed no significant discernable differences by trimester care began.

Table 4 shows significantly higher prevalence of cocaine and tobacco usage for women having low-birth-weight (LBW) infants (less than 2500 grams). There were no significant associations between substance use and LBW for white non-Hispanic women; however, for black non-Hispanic women tobacco use was significantly more prevalent in the LBW group.

Prevalence rates were also calculated for expected payment source, region of residence, prior live births and prematurity. Women in the Medicaid group had significantly higher prevalence of alcohol, tobacco, marijuana, and cocaine usage than the private insurance group, and their usage was also significantly higher than the self-pay group for tobacco and cocaine. Significantly higher ($P<0.05$) prevalence estimates were found for tobacco and marijuana usage in outstate Missouri compared to the Kansas City Metro area. The St. Louis Metro area had a significantly higher estimate of alcohol usage than the outstate area. Both St. Louis and Kansas City Metro areas had significantly higher rates of cocaine use than outstate Missouri. Women having one through four prior live births had significantly higher estimates of smoking prevalence than women having their first child. Cocaine prevalence increased with increasing birth order with women having three or more prior live births significantly more likely to use cocaine than first time mothers. Cocaine use was nearly ten times higher for women having preterm deliveries (3.8 versus 0.4) than for those having term deliveries.

Summary

All of the substances evaluated, including alcohol and tobacco, adversely effect pregnancy outcomes. The most prevalent substance used during pregnancy in 1993 and 1997 was tobacco, with estimated prevalence of more than one-in-five for both periods. Also of note is the increase in tobacco prevalence for antepartal teens and women in their early twenties. If their smoking behavior is reflective of all teens and young adult women then we can expect an overall increase in smoking during pregnancy as this age cohort moves through the fertility range.

Estimates of prevalence rates for both alcohol and cocaine show significant decreases; while slight non-significant increases were observed for marijuana, amphetamines and phencyclidine.

As with the 1993 study, women having late or no prenatal care were most likely to use one or more of the substances reviewed. This means prenatal care providers have very little or no time to intervene for this subset of users. However 72 percent of those using one or more of the reviewed substances start prenatal care in the first trimester of pregnancy, and an additional 20 percent start care in the second trimester. For those using illegal substances the corresponding percents are 64 and 18 respectively. Thus for the majority of women using substances during pregnancy there is time for assessment, education and appropriate referral. Missouri law requires that all prenatal care providers assess pregnant women for the risk and current use of alcohol, tobacco and other substances, and provide education regarding their effects on pregnant women and their fetuses. Verification of assessment and education must be documented in the prenatal record.

However for there to be any significant decrease in substance use in pregnancy there must be a decrease in the development of the habits. This means concerted efforts directed at children to not initiate these habits in the first place are needed.

| | 1993 | | | | 1997 | | | |
| | Chart | | Urine | | Chart | | Urine | |
	%	±CI*	%	±CI	%	±CI	%	±CI
Alcohol	7.9	1.3	NT	—	3.6**	0.8	1.6	0.6
Tobacco	22.5	3.4	21.9	3.6	21.7	3.3	21.0	3.1
Marijuana	1.3	0.5	4.0	1.1	1.6	0.6	4.3	1.0
Cocaine	1.1	0.5	1.3	0.6	0.7	0.3	0.7**	0.1
Opiates	0		2.2	1.0	0.01	0.02	0	0
Benzodiazepines	0		1.3	0.6	0	—	0	—
Methamphetamines	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Barbiturates	0		3.4	1.1	0.01	0.02	0.05	0.07
Phencyclidine (pcp)	0		0.02	0.04	0.01	0.02	0.03	0.04
Any drug	25.7	3.4	28.1	3.7	23.6	3.3	23.8	3.3
Illegal drugs	2.0	0.7	10.8	2.5	2.2	0.7	5.2	1.0

Table 1

**Overall Prevalence of Drug Exposure 1993 versus 1997:
Missouri 1993 and 1997 Prenatal Substance Abuse Studies**

N	2,213		2,213		3,096		3,096	

*CI – 95% confidence interval **Significantly lower (p <0.05) than the 1993 estimate. NT – Not tested for in urine.

** Significantly lower (p <0.05) than the 1993 estimate.

NT - Not tested for in urine.

Table 2 Weighted Age-Specific Prevalence of Prenatal Drug Exposure: Missouri 1997 Prenatal Substance Abuse Study								
	Under 20 (1)		20-24 (2)		25-29 (3)		30 or More (4)	
	%	±CI*	%	±CI	%	±CI	%	±CI
Alcohol	1.9	1.6	2.5	1.2	1.5	1.0	0.8	0.6
			(4)					
Tobacco	23.2	4.9	27.1	4.2	18.2	4.1	16.9	4.6
			(3,4)					
Marijuana	4.9	2.3	5.6	1.4	3.5	1.3	3.8	1.6
			(3,4)					
Cocaine	0	—	0.7	0.5	0.5	0.3	1.2	0.8
			(1)		(1)		(1)	
N	520		856		856			

The number(s) in parentheses indicate the group with prevalence estimate significantly lower (p <0.05)
than the estimate for the group shown at the head of the column.
*CI – 95 percent confidence interval

Table 3 Weighted Prenatal Care-Specific Prevalence of Prenatal Drug Exposure: Missouri 1997 Prenatal Substance Abuse Study								
Trimester Prenatal Care Began								
	First (1)		Second (2)		Third (3)		No Care (4)	
	%	±CI*	%	±CI	%	±CI	%	±CI
Alcohol	1.5	0.6	2.0	1.3	0.5	1.0	6.1	9.7
Tobacco	18.5	3.0	28.7	5.3	39.3	15.1	43.9	15.5
			(1)		(1)		(1)	
Marijuana	3.6	1.0	5.0	1.9	13.9	8.9	14.8	12.1
					(1)			
Cocaine	0.2	0.15	0.7	0.6	3.1	2.9	21.9	14.4
					(1)		(1, 2, 3)	
N	2,196		500		109		51	

The number(s) in parentheses indicate the group with prevalence estimate significantly lower
(p <0.05) than the estimate for the group shown at the head of the column.

Table 4 **Weighted Birth Weight-Specific Prevalence of Prenatal Drug Exposure by Race : Missouri 1997 Prenatal Substance Abuse Study**											
	All Races				*White non Hispanic*				*Black non Hispanic*			
	LBW		*Not LBW*		*LBW*		*Not LBW*		*LBW*		*Not LBW*	
	%	*±CI**	*%*	*±CI*	*%*	*±CI*	*%*	*±CI*	*%*	*±CI*	*%*	*±CI*
Alcohol	0.8	1.2	1.7	0.6	1.2	1.7	1.1	0.7	0	—	4.8	1.6
Tobacco	30.7*	7.4	20.1	3.4	29.9	7.5	21.9	3.9	33.3*	18.4	14.1	3.1
Marijuana	5.9	4.7	4.2	1.0	8.7	7.2	4.2	1.0	0	—	5.2	1.9
Cocaine	3.3*	2.7	0.5	0.2	0.8	1.2	0.2	0.2	10.2	9.4	2.2	1.2
N	219		2,855		151		2,035		57		634	

*Significantly higher (p <0.05) than the not LBW group.

*CI – 95 percent confidence interval

Provisional Vital Statistics for July 1998

Live births decreased in July as 6,274 Missouri babies were born compared with 6,709 in July 1997. The monthly births decreased from 14.6 to 14.0 per 1,000 population.

Cumulative births show a slight decrease for the seven months ending with July and a slight increase for the 12 months ending with July.

Deaths decreased slightly in July as 4,267 Missourians died compared with 4,288 one year earlier. Cumulative deaths for the 7- and 12-month periods ending with July also show decreases.

The **Natural increase** for July was 2,007 (6,274 births minus 4,267 deaths). The rate of natural increase in July was 4.5 per 1,000 population compared with 5.3 one year earlier.

Marriages decreased for all three time periods shown below while **dissolutions of marriage** increased for the two cumulative periods ending with July. The marriage to divorce ratio decreased from 1.76 to 1.63 for the 12 months ending with July.

Infant deaths increased in July as 58 Missouri infants died compared with 33 in July 1997. However the cumulative infant death rate for the 12 months ending with July decreased from 8.1 to 7.9 per 1,000 live births.

PROVISIONAL RESIDENT VITAL STATISTICS FOR THE STATE OF MISSOURI

	July				Jan.-July cumulative				12 months ending with July				
Item	Number		Rate*		Number		Rate*		Number			Rate*	
	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998	1996	1997	1998
Live Births	6,709	6,274	14.6	14.0	43,393	43,039	13.8	13.7	73,012	74,227	13.8	13.6	13.7
Deaths	4,288	4,267	9.3	9.5	33,017	31,441	10.5	10.0	54,279	53,262	10.2	10.1	9.8
Natural increase													
	2,421	2,007	5.3	4.5	10,376	11,598	3.3	3.7	18,733	20,965	3.7	3.5	3.9

Marriages	4,102	4,381	8.9	9.8	25,063	23,524	8.0	7.5	44,663	42,273	8.3	8.3	7.8
Dissolutions	2,320	2,307	5.1	5.2	14,986	15,236	4.8	4.8	25,377	25,870	4.8	4.7	4.8
Infant deaths	33	58	4.9	9.2	352	371	8.1	8.6	595	587	7.3	8.1	7.9
Population base (in thousands)	...	...	5,402	5,440	...	...	5,402	5,440	...	...	5,348	5,386	5,424